Simple Solutions for Lifting, Holding, and Handling Materials

The Problem

On many construction sites, workers spend time lifting, carrying, holding, pushing, or pulling loads of material. Although it is common today to use mechanical devices for some of this work, a lot of materials are still handled manually. Sometimes it is not possible to use mechanical material handling devices due to site conditions.

If you lift and carry materials often or for long periods of time, there is constant stress on your back and shoulders. Eventually you may develop a serious muscle or joint injury. You are at risk if you often handle materials that are heavy and/or bulky, carry materials long distances, stoop downward to pick up heavy objects, or stretch upward while holding them. Your risk is higher if you twist your body when handling heavy items.

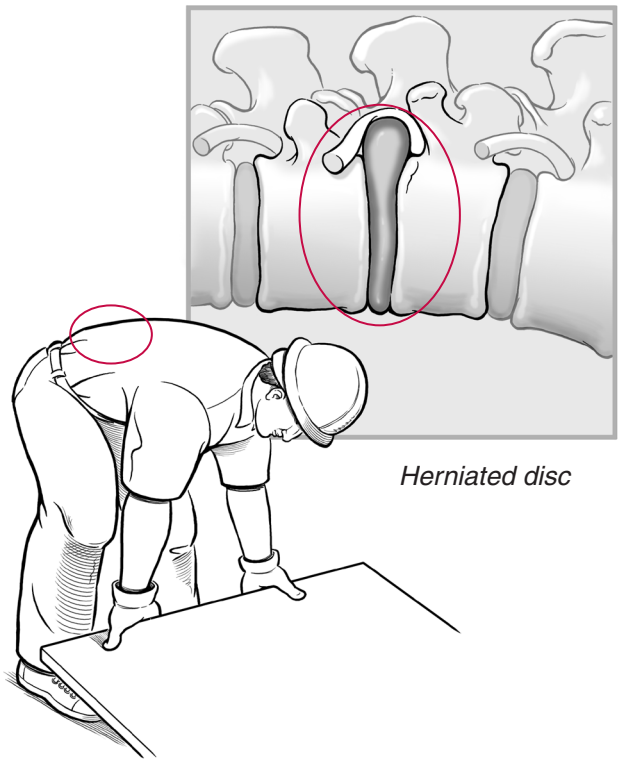
You may also develop an injury if you frequently push or pull heavy carts, dollies, or other transport equipment.

Injuries & Disorders

Below are some of the injuries you may develop when you do manual material handling.

Back. Low back pain, and more serious musculoskeletal injuries to the back, can occur suddenly or develop over a period of time. For example, sudden quick movements, especially while handling heavy objects, may lead immediately to painful muscle strains. These strains may develop into serious injuries when the muscles are not allowed to heal and are exposed to additional stress.

Your spine runs from the top of your neck down to your lower back. It is made up of many bones called *vertebrae,* one below another. Between the vertebrae are *joints* and *discs*. These give your back flexibility so it can move. The discs are flexible because they have a substance like jelly inside.



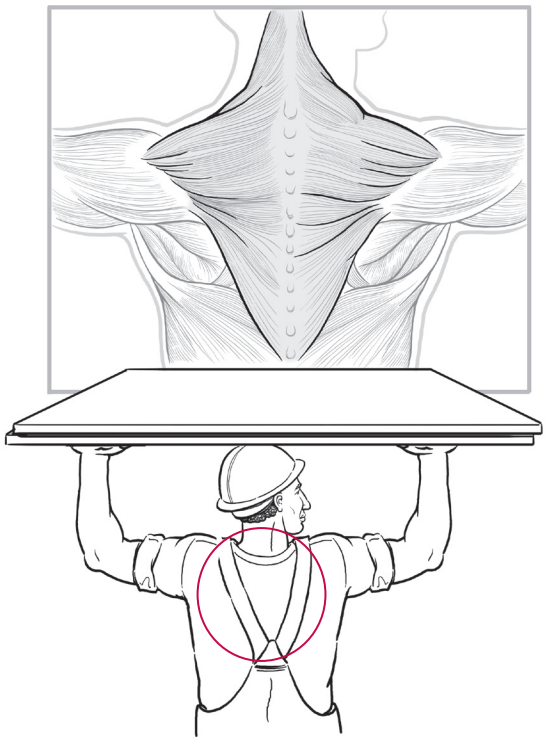
Herniated disc

When you lift, bend forward, stretch upward, or stretch outward, your back muscles work harder and the *ligaments* (long fibers supporting the back muscles) flex and stretch. The discs get squeezed. As they are squeezed, they can press on different parts of the spine, including nerves. This can cause back pain. If you bend forward over and over for months or years, the discs are weakened, which may lead to disc rupture (or "herniation").

Twisting your body while bending puts even more pressure on the discs, especially when you are exerting force to lift, push, or pull objects.

Shoulder and neck. Carrying even light loads above your shoulders may quickly lead to tired and sore neck and shoulder muscles. The risk of developing a more serious neck or shoulder problem increases when you do this work frequently or for long periods of time. Carrying or resting heavy objects on your shoulders may stress the shoulder and neck muscles and cause injury where the load contacts your body.

Trapezius muscle



The muscles in your shoulder are connected to your arm by *tendons*. Between the tendons and bones are small sacs of fluid called *bursa*. They lubricate the shoulder so it moves easily. Continual stress on your shoulder can cause the bursa to get squeezed, swollen, stiff, and inflamed (*bursitis*). Bursitis can make it painful, or even impossible, to raise your arm.

Continual stress on the shoulder can also cause the shoulder tendons to become inflamed, resulting in pain (*tendinitis*).

Another common condition is *tension neck syndrome.* This is a type of muscle strain that can cause neck stiffness, muscle spasms, and pain in the neck or radiating from the neck. It affects the *trapezius* muscle, a large, thin muscle that runs from the upper back through the shoulder area to the neck. You may notice a tender "knot" in this muscle as well as stiffness and pain.

Arms, hands, and wrists. If you carry heavy objects with hard sharp edges, they can dig into your skin and injure the soft tissues in your hands. Or, if you carry objects that are hard to grip and hold, they may force your hand or wrist into awkward, stressful positions and cause disorders like tendinitis or carpal tunnel syndrome.

Some Solutions

Manual material handling is still common in construction, but it is possible to change how you do it so it is easier on your body. Solutions are available that can reduce the level of stress on your back, shoulder, neck, and other parts of your body. They may also reduce how often and how long your body is subjected to this stress. Many of the solutions can also eliminate other potential safety hazards and increase productivity.

The type of task and the site conditions will determine which solutions are best for you. A few possible solutions for specific material handling tasks are explained in Tip Sheets #10–13.

General solutions for doing material handling with less risk of injury include:

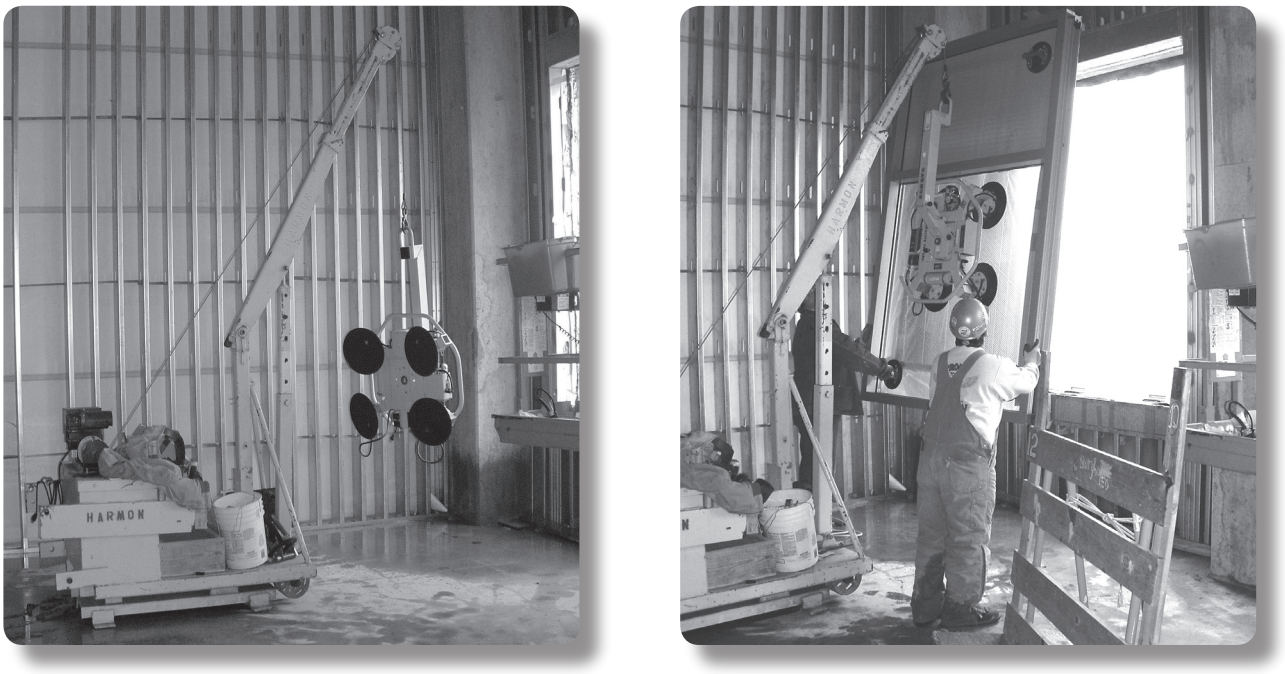
Change materials or work processes. One of the most effective solutions may be to use materials, building components, or work methods that are less labor-intensive. There are alternative materials that can be handled without requiring a lot of physical strength, an awkward posture, or repetitive motion. For example, half-weight bags of Portland cement and lightweight concrete masonry blocks are currently available in many areas. An individual construction worker or subcontractor usually cannot make a decision to switch materials. Certain changes may require the approval of the building owner, architect, engineer, or general contractor.

Change tools and/or equipment. You can buy or rent material handling devices for all aspects of construction. Devices include special round handles and cushioned grips for carrying heavy objects; powered and non-powered carts and dollies for indoor or outdoor use; rolling carts to move sheet materials, pipes, or conduit; and stands and jacks to hold materials during installation.

Mechanical, hydraulic, and vacuum lifts are available in a variety of sizes and styles. Some allow relatively easy positioning of components and materials.

Ergonomic Guidelines for Manual Material Handling (DHHS/NIOSH Publication No. 2007-131) describes many different types of material handling and transport equipment. This booklet can be accessed at *www.cdc.gov/niosh/docs/2007-131/pdfs/2007-131.pdf*.

In a few cases, cost and site conditions may restrict the use of such equipment.



Power vacuum lifter avoids manual lifting

Change work rules. For example, contractors can require that materials be stored at a convenient height off the ground and transported in most situations with mechanical devices. Improved planning of laydown areas and materials storage can minimize the number of times materials need to be moved.

Provide training and related programs. A policy of providing ergonomics training may help workers more quickly identify potential problems and find effective solutions.

Workplace exercise programs are popular in the construction industry. Although they may be a part of any effort to prevent muscle and joint disorders, exercise programs are not a substitute for other solutions. No studies have shown that they prevent injuries by themselves. Studies indicate only that exercise may have a short-term effect on reducing low back pain. There also is no evidence supporting the use of "body mechanics education" as an effective means to prevent back pain or serious back disorders. In edition, NIOSH does not recommend the use of back belts to prevent back injuries.

Training in the NIOSH lifting guidelines is especially important. NIOSH recommends that one person lift no more than 51 lbs. when the lifting can be done using the following "best practices":

- When you pick up or set down a load, don't reach more than 10 inches away from your body.
- Don't twist your body.
- Lift with your legs, not your back. Keep your back as straight as possible.
- Lift the load using a solid two-handed grip.

When lifting, holding, and positioning materials on a construction site you can't always follow these "best practices." In that case, the 51 lb. weight limit needs to be lowered. See the "Applications Manual for the Revised NIOSH Lifting Equation" (1997) for more information on how to use the guidelines. This information should be passed along to workers in training programs.